What is claimed is:

1. A system for processing vehicle powertrain torsional information, the system comprising:

a vehicle powertrain having a plurality of powertrain components including an internal combustion engine and a number of downstream components driven by the engine;

a speed sensor producing a speed signal indicative of rotational speed of one of the powertrain components; and

a control computer determining a magnitude of an Nth-order torsional component of vehicle powertrain vibration as a function of the speed signal, the control computer executing either of a diagnostic routine relating to the Nth-order torsional component and a control routine controlling operation of the vehicle powertrain away from conditions at which the magnitude of the Nth-order torsional component exceeds a threshold magnitude if the magnitude of the Nth-order torsional component exceeds the threshold magnitude for at least a first predefined duration.

2. The system of claim 1 further including a fault lamp illuminating in response to a control signal;

and wherein the control computer is operable under control of the diagnostic routine to produce the control signal to illuminate the fault lamp.

3. The system of claim 1 further including a memory unit;

and wherein the control computer is operable under control of the diagnostic routine to log in the memory unit an elapsed time that the magnitude of the Nth-order torsional component exceeds the threshold magnitude.

4. The system of claim 1 wherein the control computer is configured to control output torque of the engine by controlling fuel supplied to the engine;

and wherein the control computer is operable under control of the control routine to modify the output torque of the engine such that the resulting magnitude of the Nth-order torsional component is below the threshold magnitude.

5. The system of claim 4 wherein the control computer is further operable to delay for a second predefined duration after modifying the engine output torque and before determining the resulting magnitude of the Nth-order torsional component.

6. The system of claim 1 wherein the plurality of powertrain components includes a transmission operatively coupled to the engine and having a number of automatically selectable gears,

and wherein the control computer is operable under control of the control routine to command an automatic transmission gear shift such that the resulting magnitude of the Nth-order torsional component is below the threshold magnitude.

7. The system of claim 6 wherein the control computer is further operable to delay for a second predefined duration after commanding the automatic transmission gear shift and before determining the resulting magnitude of the Nth-order torsional component.

8. The system of claim 1 wherein the speed sensor is an engine speed sensor producing the speed signal as a function of engine rotational speed.

9. The system of claim 1 wherein the engine includes a crankshaft rotatably driven by operation of the engine;

and wherein the speed sensor is operatively coupled to one of the plurality of powertrain components.

10. The system of claim 9 wherein the plurality of powertrain components includes:

a change gear transmission operatively coupled to the engine and driven by the crankshaft; and

a tailshaft operatively coupled to, and driven by, the transmission;

and wherein the speed sensor is a tailshaft speed sensor producing the speed signal indicative of rotational speed of the tailshaft.

11. The system of claim 1 wherein the control computer is an engine control computer configured to control and manage overall operation of the engine.

12. The system of claim 1 wherein the plurality of powertrain components includes a transmission operatively coupled to the engine and having a number of automatically selectable gears;

and wherein the control computer is a transmission control computer configured to control and manage overall operation of the transmission.

13. The system of claim 12 further including:

an engine control computer configured to control and manage overall operation of the engine; and

a communication link between the transmission control computer and the engine control computer, the transmission control computer and the engine control computer communicating information therebetween via the communication link.

14. The system of claim 1 wherein the control computer includes a timer;

and wherein the first predefined duration corresponds to an elapsed time value of the timer between a first occurrence of the magnitude of the Nth-order torsional component exceeding the threshold magnitude and a predefined elapsed time value.

15. The system of claim 8 wherein the engine speed sensor is further configured to produce an engine position signal indicative of a position of a crankshaft of the engine relative to a reference position;

and wherein the first predefined duration corresponds to a predefined number of revolutions of the crankshaft of the engine, the control computer monitoring the engine position signal to determine the first predefined duration.

16. The system of claim 1 wherein the first predefined duration corresponds to a predefined number of consecutive occurrences of the magnitude of the Nth-order torsional component exceeding the threshold magnitude, the control computer monitoring the magnitude of the Nth-order torsional component to determine the first predefined duration.

17. The system of claim 1 further including a vibration damper coupled to a crankshaft of the engine, the vibration damper operable to damp vibrations resulting from rotation of the crankshaft;

wherein the Nth-order torsional component corresponds to a 6^{th}-order torsional component, the magnitude of the 6^{th}-order torsional component exceeding the threshold magnitude for the first predefined duration while operating the engine within a predefined engine speed range resulting in an increase in an operating temperature of the vibration temperature above a safe operating temperature limit.

18. The system of claim 1 wherein the plurality of powertrain components includes:

a change gear transmission operatively coupled to the engine;

a tailshaft having a first end operatively coupled to the transmission and an opposite second end;

a differential having a universal joint operatively connected to the second end of the tailshaft, the connection between the universal joint and the tailshaft defining an angular relationship therebetween having an allowable angular range;

wherein the Nth-order torsional component corresponds to a 2^{nd}-order torsional component, the magnitude of the 2^{nd}-order torsional component exceeding the threshold magnitude for the first predefined duration indicating that the angular

relationship between the universal joint and the tailshaft is outside of the allowable angular range.

19. A method of processing torsional information relating to operation of a vehicle powertrain having a plurality of powertrain components including an internal combustion engine and a number of downstream components driven by the engine, and having a speed sensor producing a speed signal indicative of rotational speed of one of the powertrain components, the method comprising the steps of:

processing the speed signal to determine a magnitude of an Nth-order torsional component of vehicle powertrain vibration; and

executing either of a diagnostic routine relating to the Nth-order torsional component and a control routine controlling operation of the vehicle powertrain away from conditions at which the magnitude of the Nth-order torsional component exceeds a threshold magnitude if the magnitude of the Nth-order torsional component exceeds the threshold magnitude for at least a predefined duration.

20. The method of claim 19 wherein the diagnostic routine of the executing step includes illuminating a fault lamp under control of the diagnostic routine.

21. The method of claim 19 wherein the diagnostic routine of the executing step includes logging in memory an elapsed time that the magnitude of the Nth-order torsional component exceeds the threshold magnitude.

22. The method of claim 19 wherein the control routine of the executing step includes modifying engine output torque such that the resulting magnitude of the Nth-order torsional component is below the threshold magnitude.

23. The method of claim 19 wherein the control routine of the executing step includes commanding an automatic gear shift of a transmission operatively coupled to the engine such that the resulting magnitude of the Nth-order torsional component is below the threshold magnitude.

24. A system for processing vehicle powertrain torsional information, the system comprising:

a vehicle powertrain having a plurality of powertrain components including an internal combustion engine and a number of downstream components driven by the engine;

a speed sensor producing a speed signal indicative of rotational speed of one of the powertrain components; and

a control computer configured to control engine fueling and to determine an engine load value as a function of the engine fueling, the control computer determining whether the engine speed signal and engine load value are within a speed-load region in which a magnitude of an Nth-order torsional component of vehicle powertrain vibration exceeds a threshold magnitude, and executing either of a diagnostic routine relating to the Nth-order torsional component and a control routine controlling operation of the vehicle powertrain away from the speed-load region if the engine speed signal and engine load value are within the speed-load region for at least a predefined duration.

25. The system of claim 24 further including a fault lamp illuminating in response to a control signal;

and wherein the control computer is operable under control of the diagnostic routine to produce the control signal to illuminate the fault lamp.

26. The system of claim 24 further including a memory unit;

and wherein the control computer is operable under control of the diagnostic routine to log in the memory unit an elapsed time that the engine speed signal and engine load value are within the speed-load region.

27. The system of claim 24 wherein the control computer is configured to control output torque of the engine;

and wherein the control computer is operable under control of the control routine to modify the output torque of the engine to move engine operating conditions away from of the speed-load region.

28. The system of claim 24 wherein the plurality of powertrain components includes a transmission operatively coupled to the engine and having a number of automatically selectable gears,

and wherein the control computer is operable under control of the control routine to command an automatic transmission gear shift to move engine operating conditions away from of the speed-load region.